

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
18 August 2005 (18.08.2005)

PCT

(10) International Publication Number
WO 2005/075629 A1

(51) International Patent Classification⁷: **C12N 5/06**,
G01N 21/41, 21/64

(21) International Application Number:
PCT/NZ2005/000002

(22) International Filing Date: 19 January 2005 (19.01.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
530972 5 February 2004 (05.02.2004) NZ

(71) Applicant (for all designated States except US): **EMBRI-
ONICS LIMITED** [NZ/NZ]; Waikato Innovation Park,
Ruakura Road, Hamilton, 2001 (NZ).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **FRONTIN-ROLLET**,
Andrew [NZ/NZ]; Waikato Innovation Park, Ruakura
Road, Hamilton 2001 (NZ).

(74) Agents: **PIPER**, James William et al.; Floor 1, 29 Water-
loo Road, Lower Hutt, 6009 (NZ).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

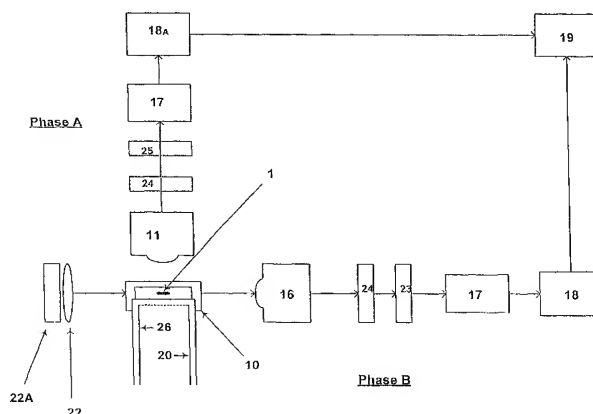
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii)) for the following designations AE,
AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,

[Continued on next page]

(54) Title: A METHOD AND APPARATUS FOR ORIENTING SPHERICAL CELLS



(57) **Abstract:** The invention relates to a method that uses the orientation of a sperm cell to determine cell differences due to size, mass, or density. Cell differences such as differences in DNA mass are used to distinguish X chromosome-bearing sperm cells from Y chromosome-bearing sperm cells and therefore have use in in-vitro and in-vivo fertilisation procedures. The orientation of individual sperm cells is determined by measuring non-fluorescent light. The method uses one detector to measure the magnitude of fluorescence (for DNA (sex) measurement from the flat surface of the spermatozoon), and a second detector to measure the magnitude of refracted non-fluorescent light derived from a separate light source. The separate light source is derived from part of a phase contrast or Dark field optical system to provide orientation data. Importantly, all excitation and fluorescent light is excluded from the second detection system by band-pass optical filters thereby providing for a cleaner signal from the concave edge (no fluorescence signal from the flat surfaces of the spermatozoon). It is reported that the orientation of a sperm cell when determined by passing light using optical phase contrast or Dark field optics through a sperm cell of interest provides for improved efficiencies, improved processing speeds and increased reliability in the results obtained. A further aspect of the invention describes an immobilising or ablative laser for immobilising or destroying unwanted sperm.



WO 2005/075629 A1



EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.